

# 1994 Northridge Earthquake 2

## Lecture Objectives

- hazard map predictions
- mitigation lessons learned

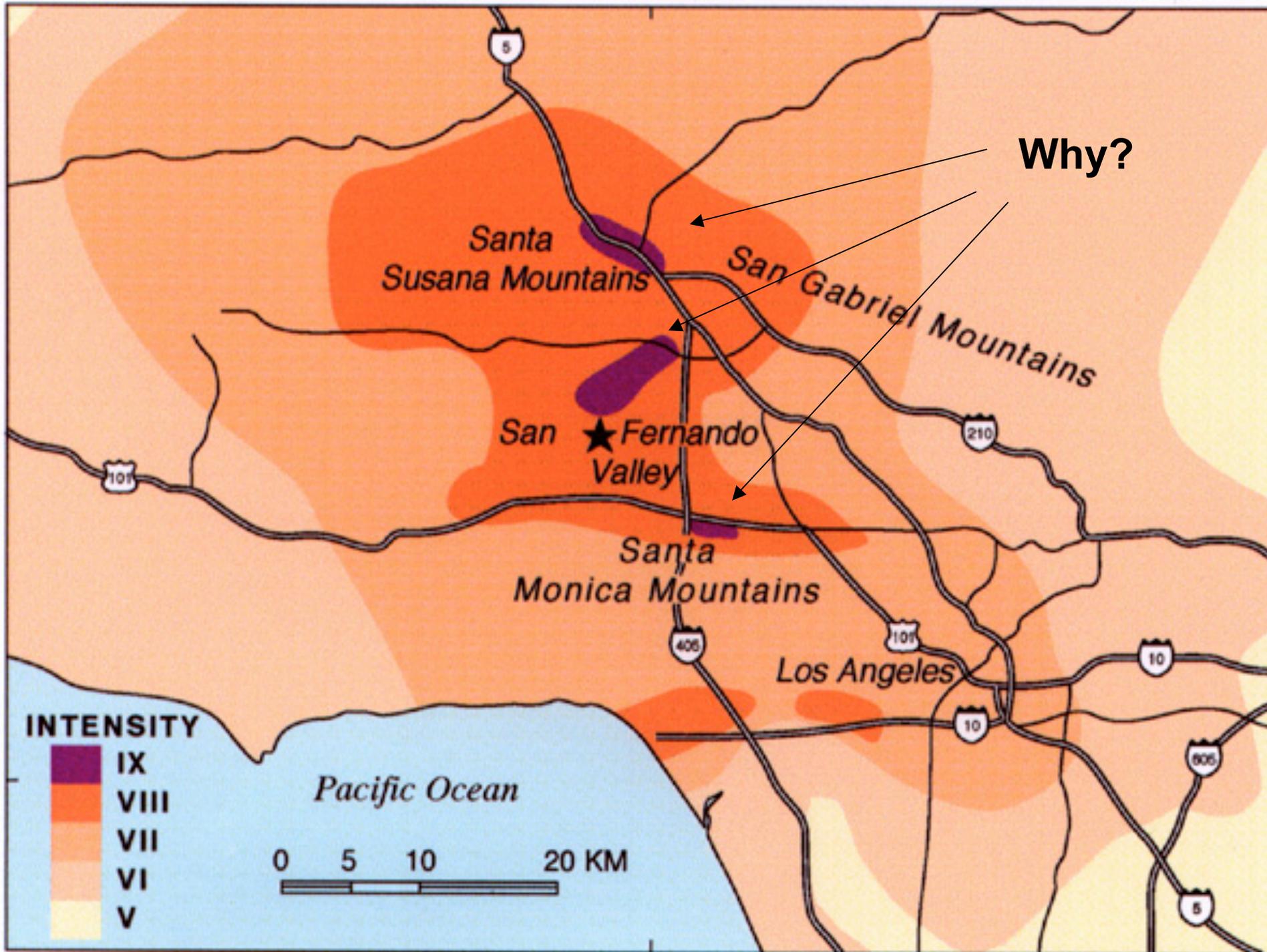
Notes from:

<http://greenwood.cr.usgs.gov/pub/open-file-reports/ofr-96-0263/>

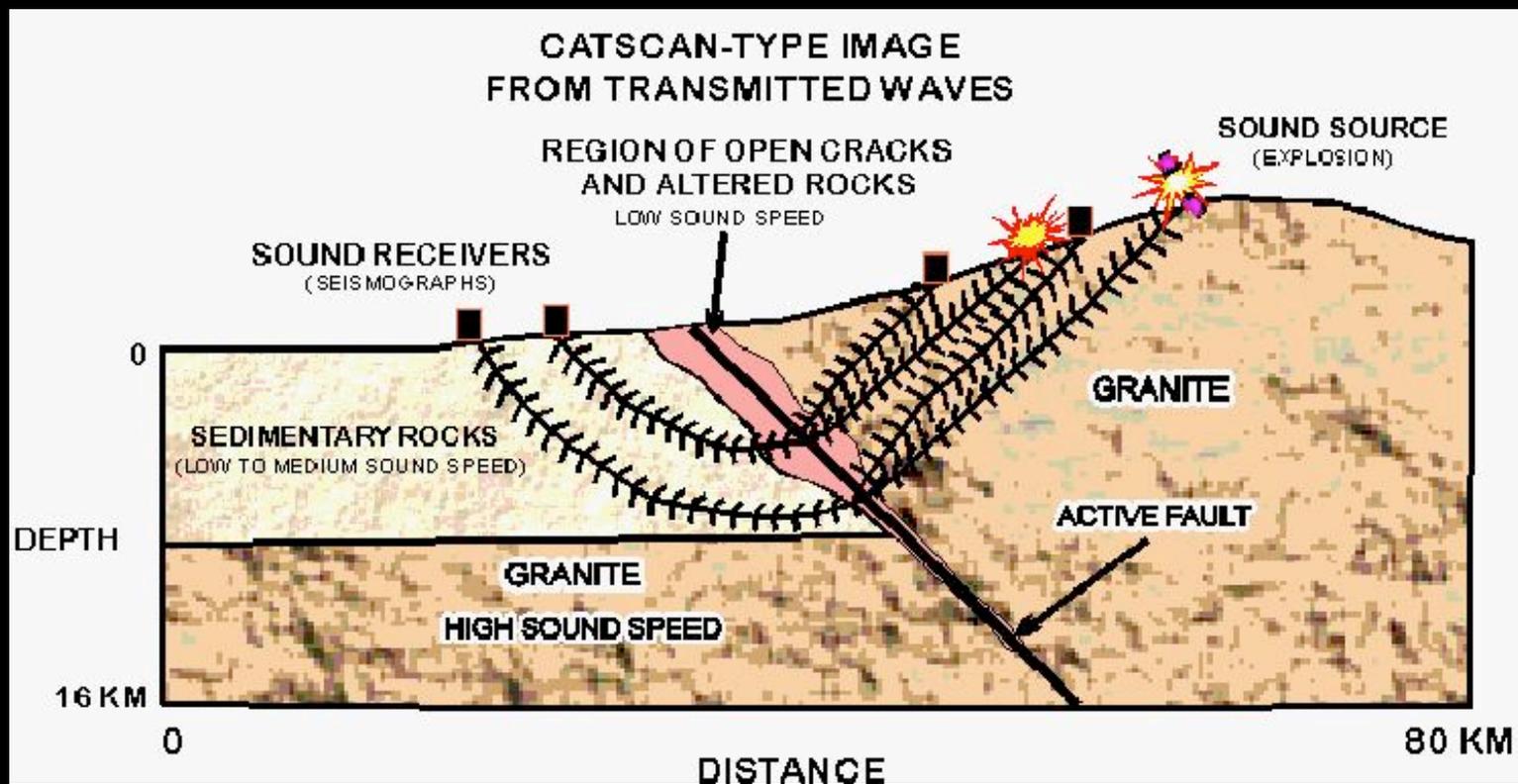
# **Mercalli Index Quiz**

**-At what level does considerable damage to structures occur?**

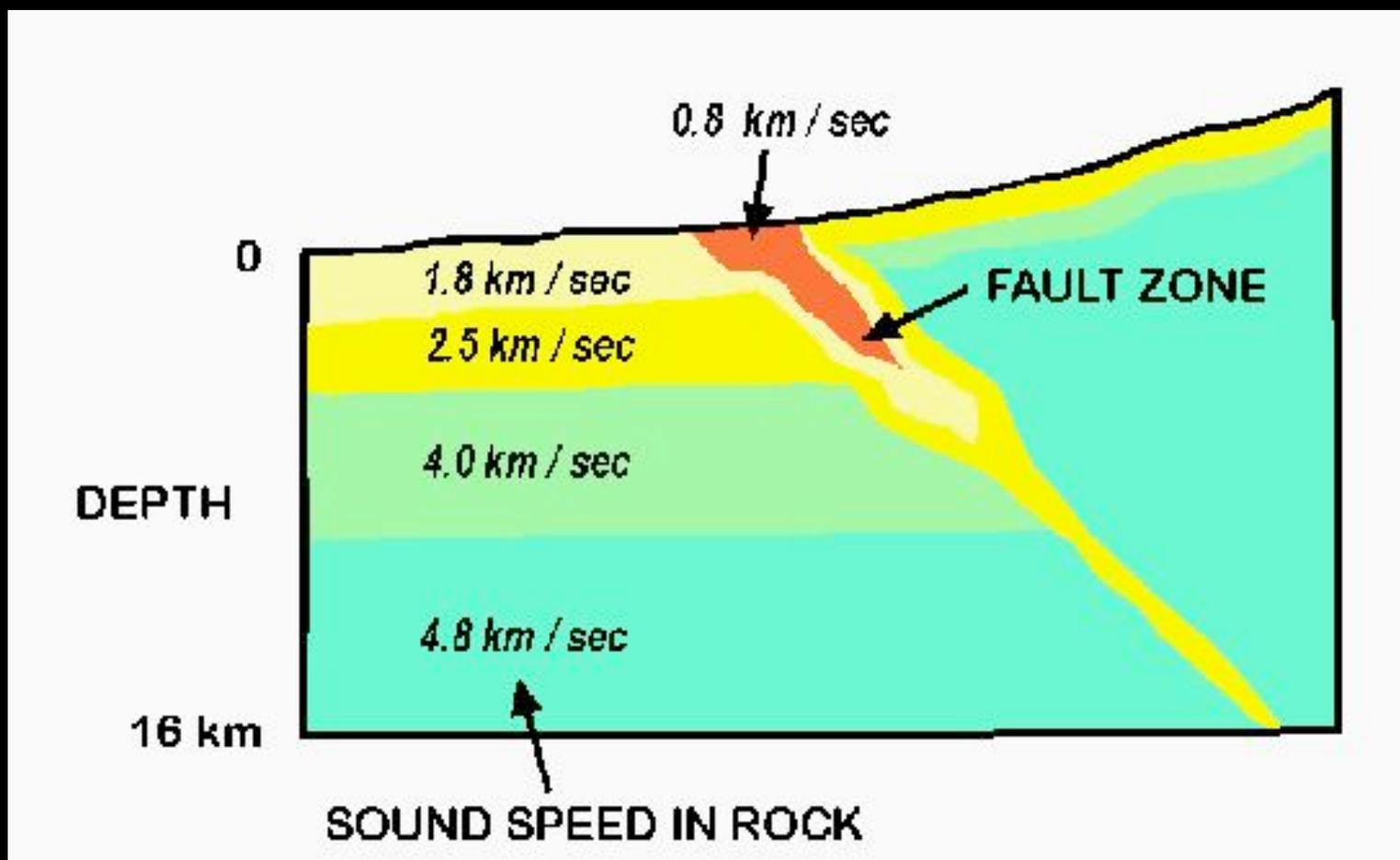
**-Give an example of how the Mercalli Index can be used for earthquake hazard studies.**



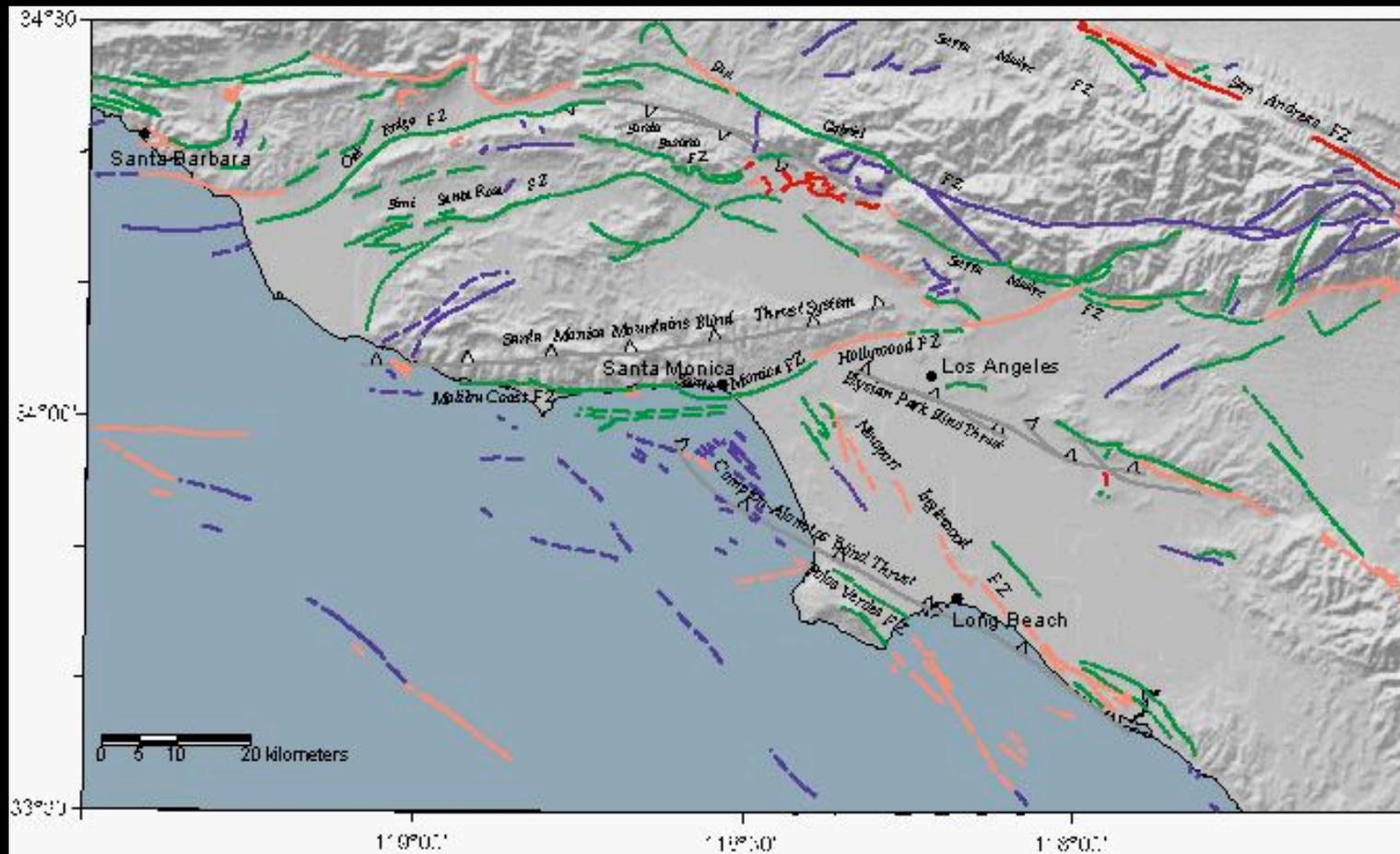
# Los Angeles Region Seismic Experiment (LARSE): seismic refraction study to study subsurface



## Seismic reflection

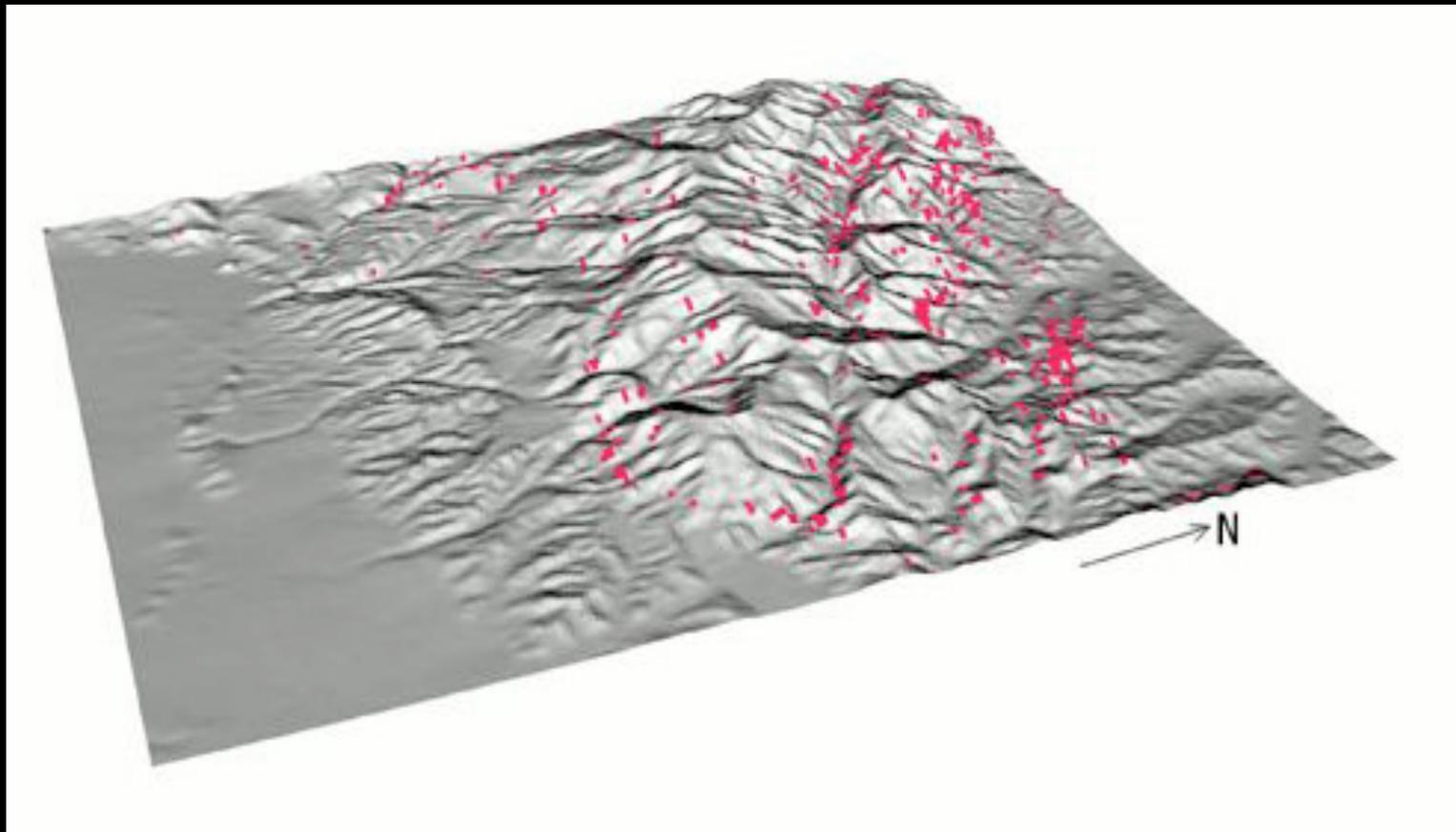


## A planner's nightmare

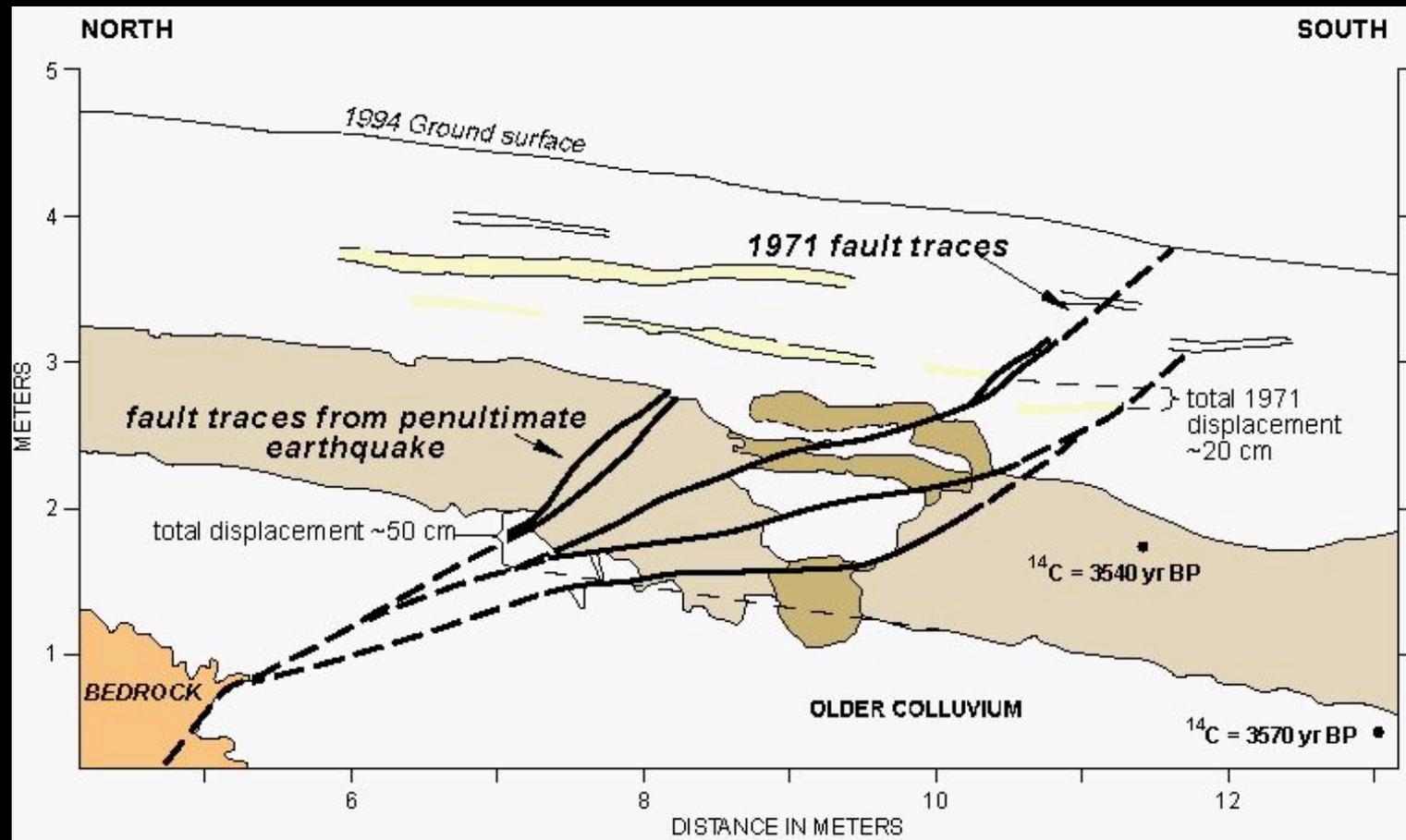


*The digital fault and fold map for southern California highlights blind thrust systems and other principal faults. Faults exposed at the surface are color-coded according to slip rates and earthquake recurrence intervals, with the red and orange features having higher rates of activity than the green and blue. Specific data on all faults are included in the geologic database.*

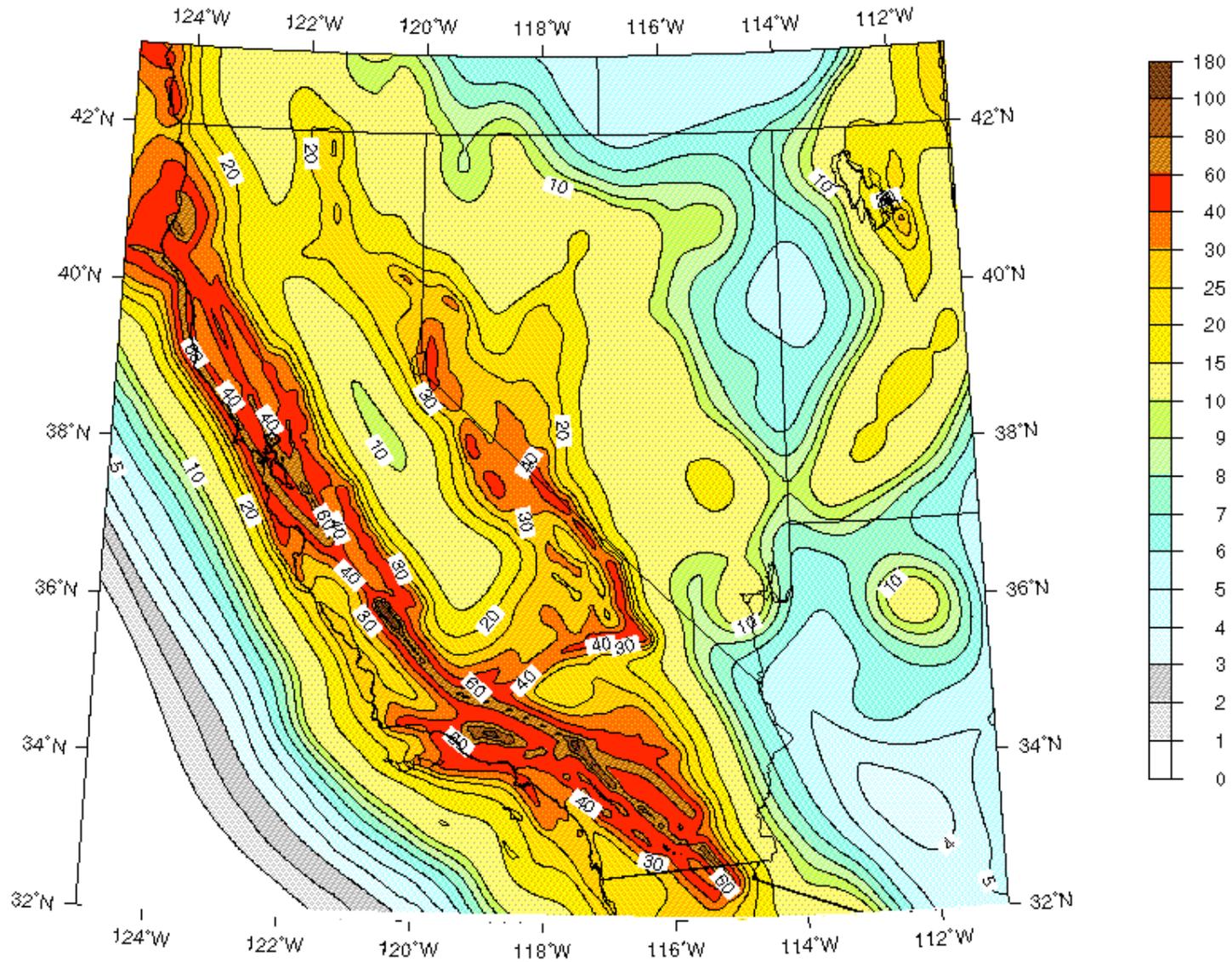
Landslide locations: cut off roads, pipelines; dammed streams;  
secondary result produced increased valley fever cases



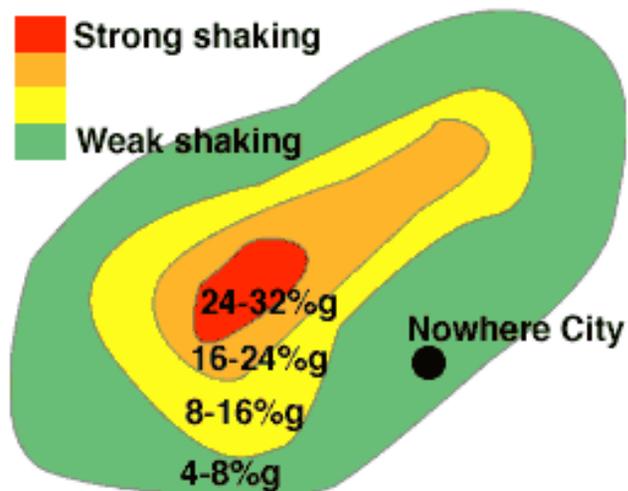
# Trenching: mapping displacements from historic activity; determine frequency, magnitude, type



**Peak Acceleration (%g) with 10% Probability of Exceedance in 50 Years**  
**USGS Map, Oct. 2002rev**



## How to read a hazard map



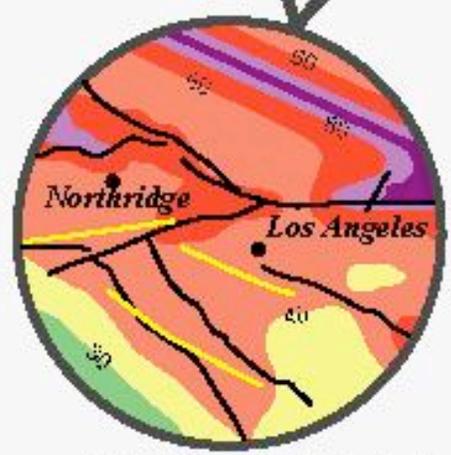
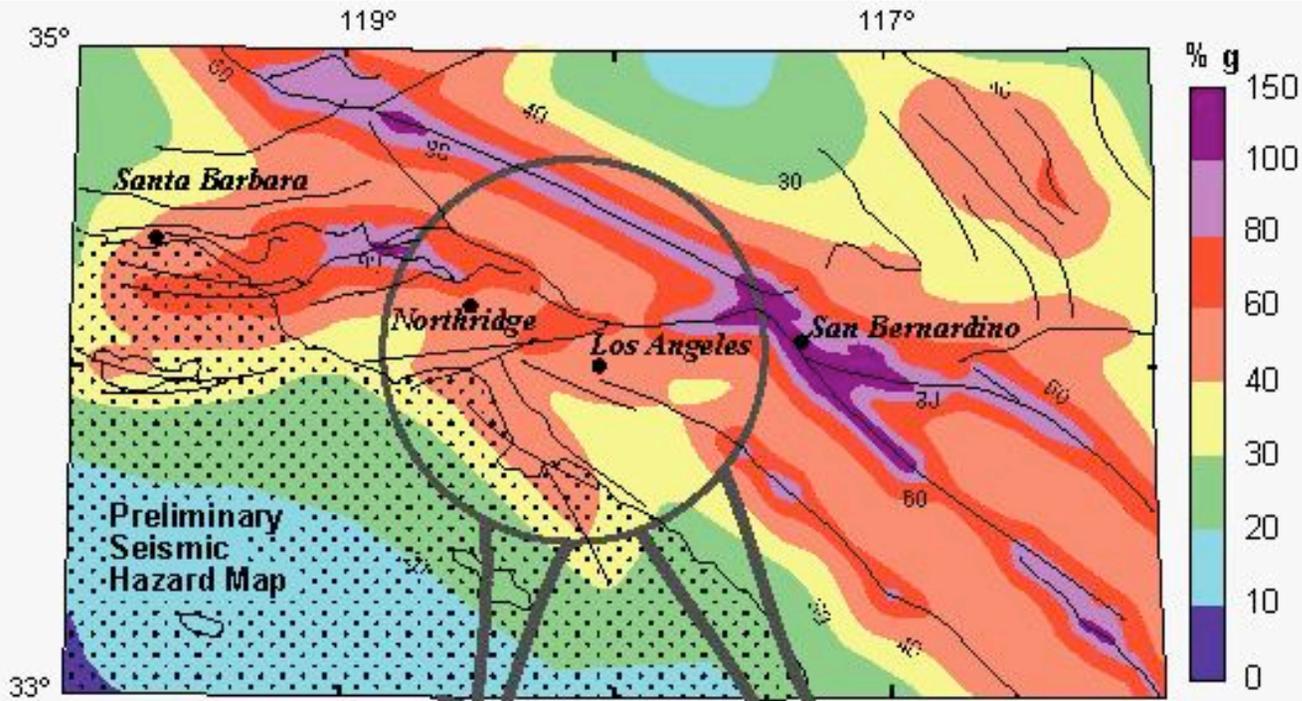
Suppose the map on the left is the map given:

a 50-year time interval  
a 5% chance of exceedence  
a [PGA](#) map

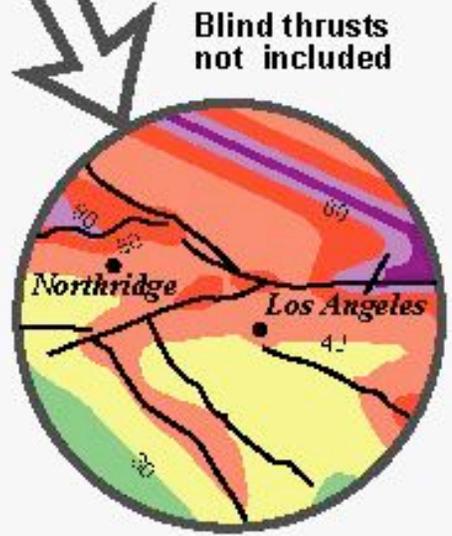
We would read the shaking hazards for Nowhere City as:

The earthquake peak ground acceleration (PGA) that has a 5% chance of being exceeded in 50 years has a value between 4 and 8% g.

**PGA= Peak Ground acceleration**



**Blind thrusts included**



**Blind thrusts not included**

# Summary

- seismic energy focused in many (predictable) ways
- mitigation must prepare for localized regions of intense shaking
- need to consider blind faults in hazard mapping
- utility of shaking intensity maps: a GIS application of tagging damaged structures
- mitigation engineering: soil treatments, structural foundation isolation
- development of broadcast system following seismic events
- special effects of public education: seismic hazard publications
- education: both science and public forums supported by the USGS